

Well Locations/Borings  
Riverfront & Main Plant sites

December 5, 1984

Monitoring Program for Upper Groundwater Table--Riverfront and  
Spray Pond Areas, Amoco Oil Company, Wood River, Illinois

1. Water elevations in the following wells will be determined monthly until a determination can be made on the hydraulic gradient and flow direction:

Riverfront Area

RL-1S  
RL-2S  
RL-3S  
RL-4S  
RL-6S  
RL-7S  
RL-9S  
RL-12S  
RL-14S  
P-5S  
P-6S (New Well)  
P-9S  
P-12S

Spray Pond Area

RP-2S  
RP-3S  
RP-4S  
RP-8S (New Well)  
B-8S  
H-38

2. Beginning in 1985, the following wells will be sampled and tested quarterly to establish background quality:

Riverfront Area

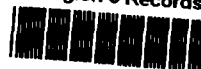
RL-1S  
RL-2S  
RL-6S (New Well)  
RL-11S  
RL-12S  
P-9S  
P-12S

Spray Pond Area

RP-2S  
RP-4S  
RP-8S (New Well)  
B-8S  
H-38

3. Sampling, sample preservation, chain-of-custody records, and analytical methods shall be identical to those in the monitoring program for the uppermost aquifer.

EPA Region 5 Records Ctr.



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4. During 1985, each well will be tested each quarter for the following parameters:

arsenic	endrin
barium	lindane
cadmium	methoxychlor
chromium	toxaphene
fluoride	2,4-D
lead	2,4,5-TP Silvex
mercury	radium
nitrate (As N)	gross alpha
selenium	gross beta
silver	turbidity
chloride	coliform bacteria
iron	pH*
manganese	specific conductance*
phenols	total organic carbon*
sodium	total organic halogen*
sulfate	

\*In quadruplicate on up-gradient well samples.

5. In subsequent years, the following testing frequency will be used:

<u>Semi-Annually*</u>	<u>Annually</u>
pH	chloride
specific conductance	iron
total organic carbon	manganese
total organic halogen	phenols
	sodium
	sulfate

\*These tests in quadruplicate on all well samples.

6. As weather permits, a minimum of three slug tests will be run in the riverfront area, and a minimum of two slug tests will be run in the spray pond area.
7. Maps showing the waste management boundaries are attached.
8. Locations of observation and monitoring wells are shown in attached Figures 1-3.
9. Boring logs and construction diagrams for all wells are attached.

EJS/ab

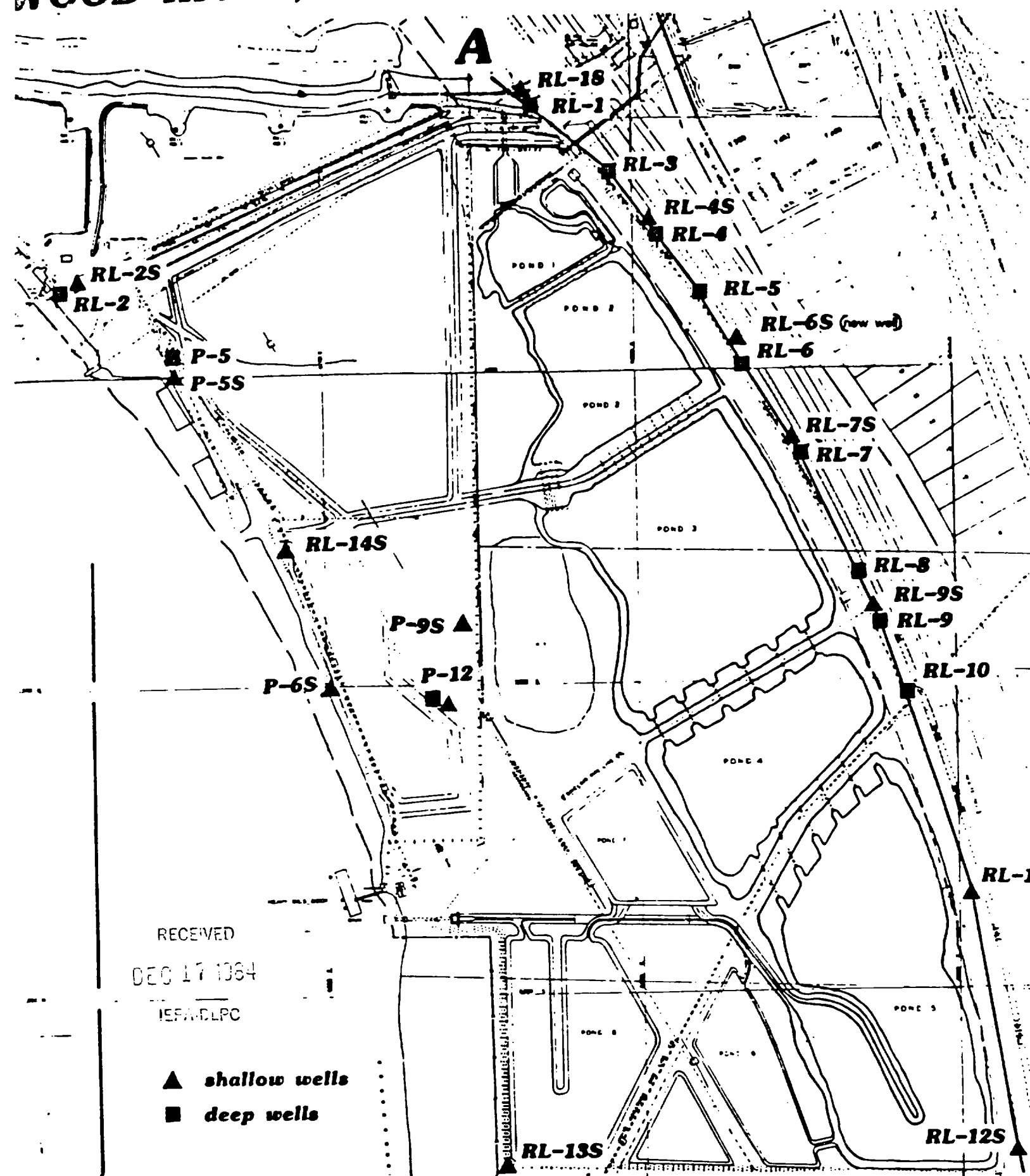
Attachments

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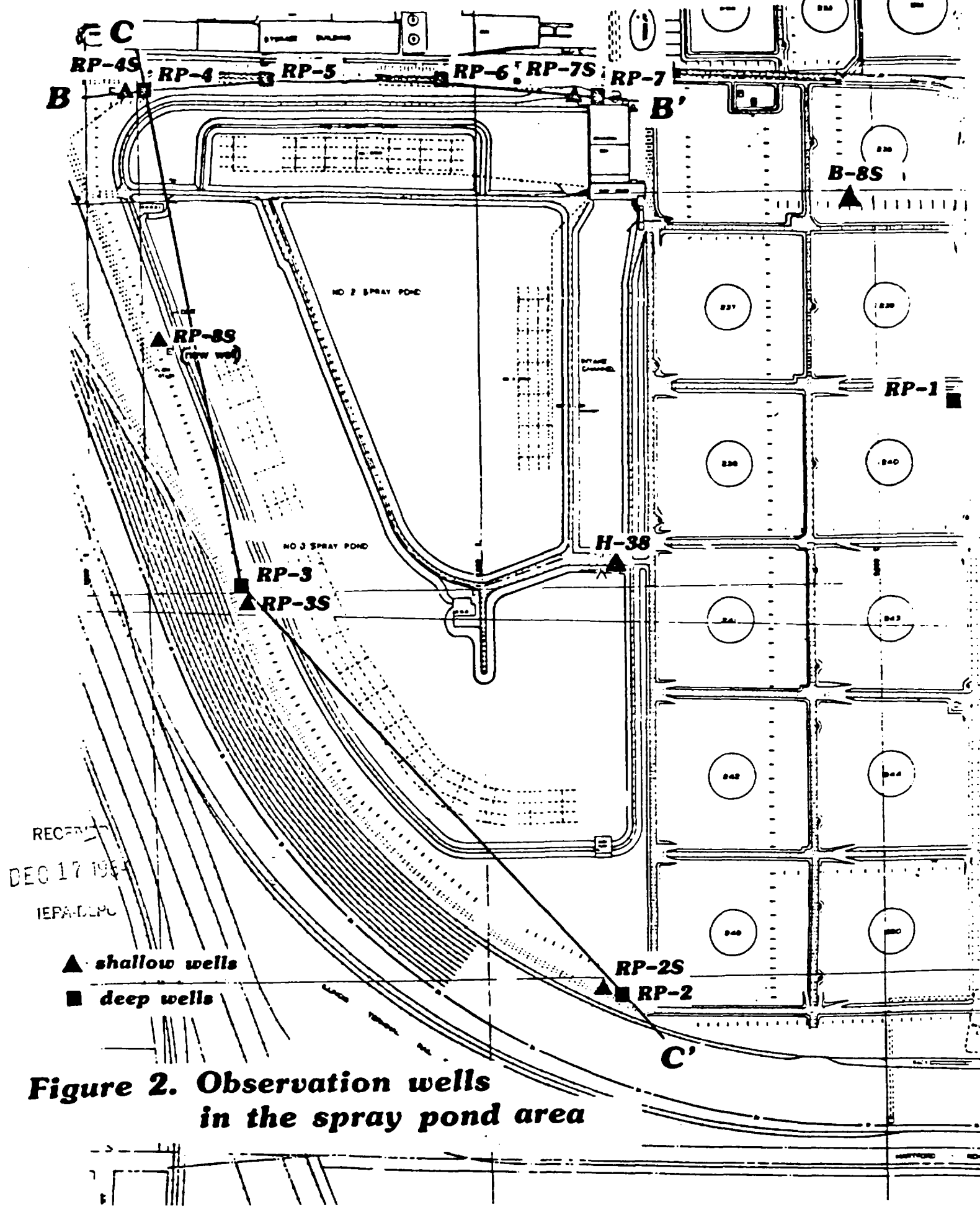
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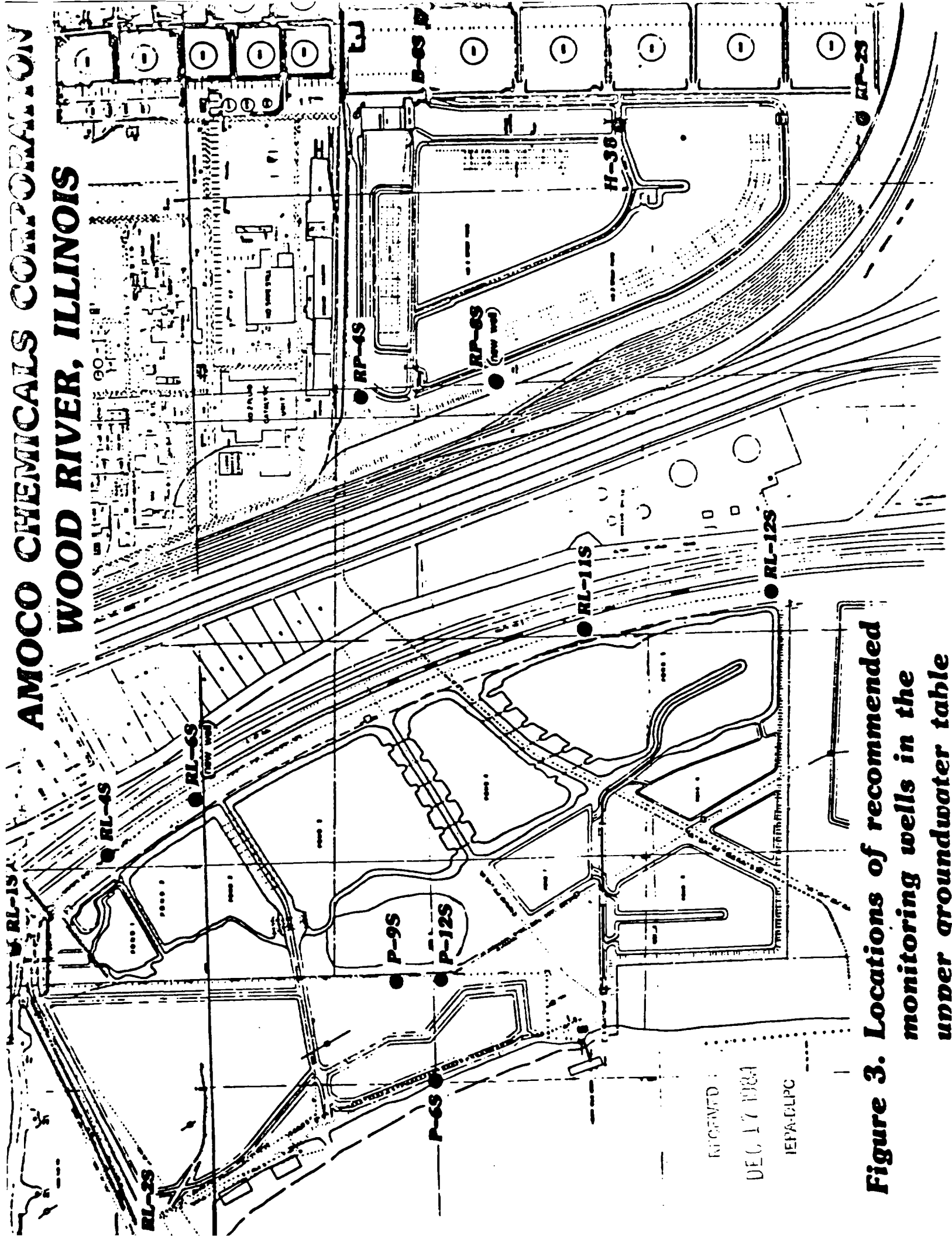
# AMOCO CHEMICALS CORPORATION WOOD RIVER, ILLINOIS



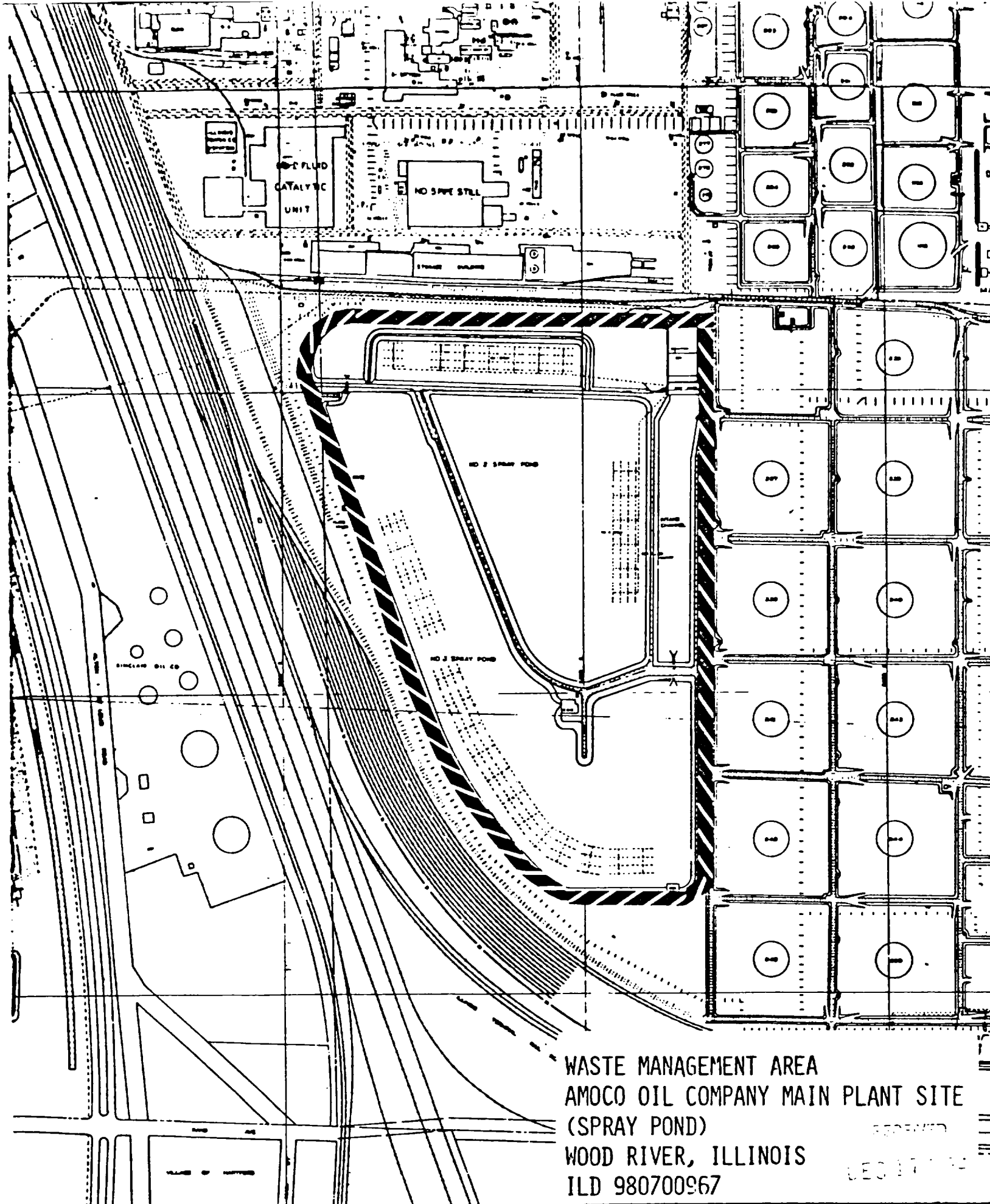
**Figure 1. Observation wells  
in the riverfront area**

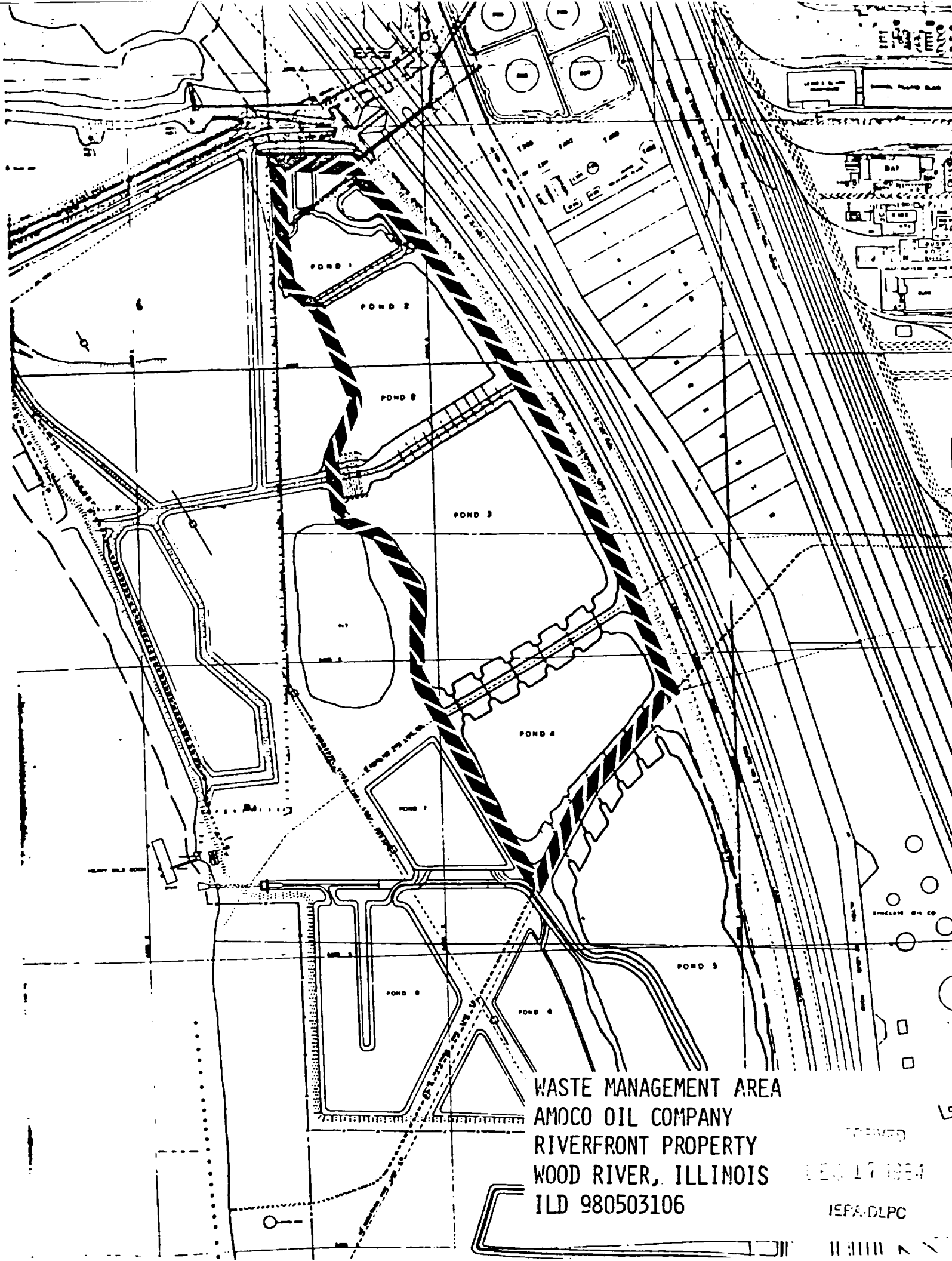
# AMOCO CHEMICALS CORPORATION WOOD RIVER, ILLINOIS





**Figure 3. Locations of recommended monitoring wells in the upper groundwater table**





WASTE MANAGEMENT AREA  
AMOCO OIL COMPANY  
RIVERFRONT PROPERTY  
WOOD RIVER, ILLINOIS  
ILD 980503106

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BORING WELL 8-85

CONTRACT		DATE DRILLED		PIEZOMETER		DRILLING METHOD		DRILLED BY		LOGGED BY		HARDING	
818-80		7-11-80		Yes		Hollow Auger		Simoncini					
DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL	BLOWS	DRY UNIT WEIGHT PCF	SHEAR STRENGTH, TSF		WATER CONTENT, %				
							0 0.5 1.0 1.5 2.0 2.5		0 20 40 60 80 100				
				SURFACE ELEVATION 98.97									
	1	SS		Black Cinders									
				Dark Gray & Gray CLAY	2-4								
				-w/Slight Contaminant Odor @ 1.5'									
5	2	SS		-Gray w/Oxidized Stain Below 4.0'	3-5								
	3	SS			4-5								
				-w/Fine Sand & Slight Contaminant Odor Below 9.0'	4-5								
10	4	SS											
				Gray & Brown Fine SAND	6-6								
	5	SS		-w/Slight Contaminant Odor From 11.5 to 30.5'									
				-Brown @ 14.0'	8-8								
15	6	SS											
				-Gray Below 19.0'	8-12								
20	7	SS											
					9-10								
25	8	SS											
					3-5								
30	9	SS											
35	10	SS	Encountered Water @ 35.0'	-Fine to Coarse From 34.0' to 40.5' Contd.	16-15								

GROUND WATER DEPTH AT COMPLETION \_\_\_\_\_ AFTER 21 days 35.8' AFTER \_\_\_\_\_

SCALE 1" = 5.01

**JOHN MATHES & ASSOCIATES, INC.**

# RECORD OF SUBSURFACE EXPLORATION

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PROJECT AMOCO, Refinery Monitoring Wells

BORING WELL B-85PA-DLF

CONTRACT 818-80 DATE DRILLED 7-11-80 DRILLED BY Harding  
 DRILLING METHOD Hollow Auger PIEZOMETER Yes LOGGED BY

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL	BLOWS	DRY UNIT WEIGHT PCF	SHEAR STRENGTH, TSF By $\sigma_v$ $\sigma_v'$ $\sigma_v''$	WATER CONTENT, %
				SURFACE ELEVATION <u>63.87</u>				
	10	SS	Added Water to Augers @ 35.5'	Gray Fine To Coarse SAND				
40	11	SS		-w/Traces Of Gravel @ 39.0'	12-20			
45	12	SS	Wash Bore Sample 12	-Fine to Medium w/Traces of Coarse Sand Below 44.0'	15-17			
50				TOB				

GROUND WATER DEPTH AT COMPLETION \_\_\_\_\_ AFTER \_\_\_\_\_ AFTER \_\_\_\_\_

SCALE 1" = 5.0'

JOHN MATHES & ASSOCIATES, INC.

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DEPTH IN FEET	OTHER TESTS	PIEZOMETER INSTALLATION	ATTERBERG LIMITS		FIELD MOISTURE CONTENT %	DRY DENSITY PCF
			LIQUID LIMIT	PLASTICITY INDEX		
0						
5						
10	GRAIN SIZE $k=1.68 \times 10^{-6} \text{ cm/sec}$ $k=3.00 \times 10^{-8} \text{ cm/sec}$ RETEST		76	47	36.4	
15						
20	GRAIN SIZE				12.6	
25						
30						

# BORING B-4 WELL H-38

SURFACE ELEVATION 435.30

BLOW COUNTS  
SAMPLES

SYMBOLS		DESCRIPTIONS	ELEVATION IN FEET
7		GRAY SILTY CLAY, TRACE BROWN SILTY MODULES AND ROOTS (FILL)	- 43
P		GRAY SILTY CLAY, TRACE BROWN SILTY MODULES (ALLUVIUM)	- 43
8		GRADES BAKER CLAY, ORGANIC ODOR	- 42
P	CH	GRADES WITH TRACE MEDIUM SAND	- 42
9		SLIGHT HYDROCARBON ODOR	- 42
P		GRADES WITH SOME FINE TO MEDIUM SAND	- 41
12	SM	GRAY SILTY FINE TO MEDIUM SAND, SOME CLAY (ALLUVIUM)	- 41
P	CL	GRAY SILTY CLAY (ALLUVIUM)	- 41
19		BROWN FINE TO MEDIUM SAND, TRACE COARSE SAND (GLACIAL OUTWASH)	- 41
P	SP	GRADES WITH MORE COARSE SAND	- 41

BORING COMPLETED AT A DEPTH OF 27.0 FEET AND CROUTED TO SURFACE ON 6-6-81.  
NO FREE WATER ENCOUNTERED.  
BORING CROUTED WITH CEMENT BENTONITE MUD.

AMOCO CHEMICALS CORPORATION

WELL H-38

LOG OF BORING

Table 1

Observation Wells Installed in the Spray Pond Area

Well #1. Located 50 feet west of tank 826, 50 feet south of road on north side of spray pond 1.

RP-7  
Elev: 435.42'  
S-U: 2'-8"  
(Stick-Up)

Depth interval    Material encountered

0 - 7 feet	Fill
7 - 9	same, hydrocarbon odors
9 - 19	Clay, silty, dark green-brown
19 - 34	Sand, very fine to medium, silty
34 - 49	same, fine to coarse, moist
49	Total depth    Developed: Air Jetting

10 slot screen set 39 to 49, gravel-packed, bentonite seal 16 to 19 feet

Well #2. Located 5 feet west-southwest of well #1.

RP-7S  
Elev: 435.50'  
S-U: 2'-8"

Depth interval    Material encountered

0 - 7 feet	Fill, silty, dark brown
7 - 9	same, hydrocarbon odor
9 - 14	Clay, dark brown to dark gray
14	Total depth    Developed: Air Jetting

20 slot screen set 4 to 14, gravel-packed, sealed at surface

Well #3. Located on south side of road, 400 feet west of well #1.

RP-6  
Elev: 433.10  
S-U: 2'-7"

Depth interval    Material encountered

0 - 8 feet	Fill, silt and gravel
8 - 19	Clay, gray to tan-brown
19 - 22	Silt, very sandy
22 - 39	Sand, very fine to medium
29 - 49	same, wet
49	Total depth    Developed: Air Jetting

10 slot screen set 39 to 49, gravel-packed, bentonite seal 16 to 19 feet

Well #4. Located 485 feet west of #3, 10 feet south of road.

RP-5  
TAC Elev: 432.42  
S-U: 2'-3"

Depth interval	Material encountered
0 - 4 feet	Fill, silty, black, h-c odor 3 to 4
4 - 16	Clay, gray-brown
16 - 22	Sand, silty
22 - 39	same, no silt
39 - 49	same, wet
49	Total depth      Developed: Air Jetting

10-slot screen set 39 to 49, gravel-packed, bentonite seal 13 to 16 feet

Well #5. Located 100 feet south of road, 370 feet west of #4.

RP-4  
Elev: 434.34  
S-U: 2'-5"

Depth interval	Material encountered
0 - 9 feet	Fill, silt and gravel
9 - 17	Silt, gray, sandy, strong h-c odor
17 - 21	Clay, gray-green
21 - 26	Sand, silty, moist
26 - 37	same, very fine to medium
37 - 49	same, wet
49	Total depth      Developed: Air Jetting

10-slot screen set 35 to 45, bentonite seal 18 to 21 feet

Well #6. Located 12 feet west of #5.

RP-4S  
Elev: 434.71  
S-U: 2'-5"

Depth interval	Material encountered
0 - 7 feet	Fill
7 - 14	Silt, black, strong h-c odor
14	Total depth      Developed: Air Jetting

20-slot screen set 4 to 14, sealed to surface

Well #7. Located about 600 feet south of flare stack,  
10 feet east of road on west side of spray pond 3.

RP-3  
Elev: 435.66'  
S-U: 1'-10"

Depth interval    Material encountered

0 - 4 feet	Fill, silty, black
4 - 27	Clay, gray-green to brown
27 - 34	Silt, yellow-brown, wet
34 - 44	Sand, very fine to coarse, wet
44	Total depth    Developed: Air Jetting

10-slot screen set 34 to 44, gravel-packed, bentonite  
seal 18 to 21 feet

Well #8. Located 5 feet south of well #7.

RP-3S  
Elev: 435.53'  
S-U: 1'-8"

Depth interval    Material encountered

0 - 5 feet	Fill
5 - 14	Clay, gray to yellow-brown
14	Total depth    Developed: Air Jetting

20-slot screen set 4 to 14, sealed to surface

Well #9. Located 10 feet north of road on south side of  
spray ponds, 50 feet west of road on west side of tank farm.

RP-2  
Elev: 435.63'  
S-U: 2'-2"

Depth interval    Material encountered

0 - 6 feet	Fill, silt and cement
6 - 16	Silt, black to gray-green
16 - 39	same, yellow-brown, sandy, wet
39 - 44	Clay, gray, wet
44 - 49	Sand, silty, very wet
49	Total depth    Developed: Air Jetting

10-slot screen set 39 to 49, gravel-packed, bentonite  
seal 14 to 17

Well #10. Located west of well #9.

RP-2S  
Elev: 435.95  
S-U: 2'-6"

Depth interval    Material encountered

0 - 6 feet	Fill
6 - 14	Silt, black to gray-green
14	Total depth    Developed: Air Jetting

20-slot screen set 4 to 14, sealed to surface

Well #11. Located northeast of tank 240 in tank bottom, 20 feet south and 40 feet west of roads.

RP-1  
Elev: 431.05'  
S-U: 2'-5"

Depth interval    Material encountered

0 - 2 feet	Fill	
2 - 9	Clay, dark gray to yellow-brown	
9 - 12	Silt, sandy	
12 - 39	Sand, very fine to medium	
39 - 49	same, wet	
49	Total depth	Developed: Air Jetting

10-slot screen set 39 to 49, gravel packed, bentonite seal 8 to 11 feet

Table 2

Observation Wells Installed in the Riverfront Area

Well #12. Located 75 feet north of road on south end of pond 5, 4 feet east of road on east side of pond 5.

RL-12S  
Elev: 426.26'  
S-U: 3'-2"

Depth interval    Material encountered

0 - 3 feet	Fill, silt and sand, light brown
3 - 9	Silt, light brown to gray, sandy
9 - 14	same, moist
14	Total depth    Developed: Air Jetting

20-slot screen set 4 to 14 feet, gravel-packed, bentonite seal to surface

Well #13. Located 30 feet north of gate to drive between ponds 4 and 5, 3 feet east of road.

RL-10  
Elev: 427.88'  
S-U: 2'-6"

Depth interval    Material encountered

0 - 4 feet	Silt, brown, sandy
4 - 9	Clay, dark brown to black
9 - 17	same, moist
17 - 24	Clay, yellow-brown, silty
24 - 34	Sand, very fine to medium, wet
34	Total depth    Developed: Air Jetting

10 -slot screen set 24 to 34, gravel-packed, bentonite seal 16 to 18 feet

Well #14. Located 50 feet south of gate to drive between ponds 3 and 4, 5 feet east of road.

RL-9  
Elev: 430.43'  
S-U: 2'-6"

Depth interval    Material encountered

0 - 9 feet	Silt, brown to black, moist
9 - 17	Clay, dark gray, silty
17 - 24	Silt, clayey, green-gray
24 - 29	same, sandy, wet
29 - 39	Sand, very fine to medium, red-brown, wet
39	Total depth    Developed: Air Jetting

10-slot screen set 29 to 39, gravel-packed, bentonite seal 20 to 22 feet

Well #15. Located 7 feet north of #14.

RL-9S  
Elev. 430.56'  
S-U: 2'-1"

Depth interval    Material encountered

0 - 4 feet	Silt, yellow-brown
4 - 9	Clay, silty, black
9 - 14	same, green-gray
14	Total depth    Developed: Air Jetting

20-slot screen set 4 to 14, gravel-packed, bentonite seal to surface

Well #16. Located 100 feet north of gate to divide between ponds 2 and 3, 3 feet east of road.

RL-B  
Elev: 431.35'  
S-U: 3'-0"

Depth interval    Material encountered

0 - 4 feet	Silt, light brown
4 - 9	Clay, dark brown, silty
9 - 19	same, gray-green, wet
19 - 29	Silt, light brown, wet
29 - 39	Sand, very fine to medium, wet
39	Total depth    Developed: Air Jetting

10-slot screen set 29 to 39, gravel-packed, bentonite seal 18 to 20 feet

Well #17. Located 250 feet south of gate to drive between ponds 2 and 3, 3 feet east of road.

RL-7  
Elev: 430.59  
S-U: 2'-8"

Depth interval    Material encountered

0 - 4 feet	Silt, light brown, sandy
4 - 14	Clay, dark gray-brown, silty
14 - 24	same, yellow-brown
24 - 29	Silt, dark green-gray, wet
29 - 39	Sand, very fine to medium, wet.
39	Total depth    Developed: Air Jetting

10-slot screen set 29 to 39, gravel-packed, bentonite seal 18 to 20 feet

Well #18. Located 50 feet north of gate to drive between ponds 2 and 3, 2 feet east of road.

RL-6  
Elev: 433.46'  
S-U: 2'-3"

Depth interval    Material encountered

0 - 4 feet	Fill, silt and road gravel
4 - 17	Silt, dark gray-brown
17 - 32	same, yellow-brown, clayey
32 - 44	Sand, very fine to medium, wet
44	Total depth      Developed: Air Jetting

10-slot screen set 34 to 44, gravel-packed, bentonite seal 17 to 20 feet

Well #19. Located 325 feet north of gate to drive between ponds 2 and 3, 5 feet east of road.

RL-5  
Elev: 429.28'  
S-U: 2'-11"

Depth interval    Material encountered

0 - 2 feet	Fill, silt and clay
2 - 4	Silt, dark green-gray, clayey
4 - 21	Clay, gray to gray-green, silty
21 - 34	Sand, very fine to medium, wet
34	Total depth      Developed: Air Jetting

10-slot screen set 24 to 34, gravel packed, bentonite seal 17 to 19 feet

Well #20. Located at south corner of gate to drive between ponds 1 and 2, 4 feet east of road.

RL-4  
Elev: 427.54'  
S-U: 2'-9"

Depth interval    Material encountered

0 - 4 feet	Silt, tan-brown to black, clayey
4 - 14	Clay, dark gray, silty, wet
14 - 19	Silt, green-gray, sandy, wet
19 - 24	Clay, gray, silty
24 - 39	Sand, very fine to fine, wet
39	Total depth      Developed: Air Jetting

10-slot screen set 26 to 36, gravel-packed, bentonite seal 20 to 22 feet

Well #21. Located 5 feet north of #20.

RL-4S  
Elev: 427.55  
S-U: 2'-7"

Depth interval    Material encountered

0 - 4 feet	Silt, tan-brown to black
4 - 11	Clay, black, hydrocarbon odor
11 - 19	Silt, dark gray, clayey, wet
19	Total depth    Developed: Air Jetting

10-slot screen set 8 to 18, gravel packed, bentonite seal 6 to 8 feet

Well #22. Located 150 feet south of guard house, 30 feet south of gate, 5 feet east of road.

RL-3  
Elev: 428.43  
S-U: 2'-7"

Depth interval    Material encountered

0 - 2 feet	Rocks and fill
2 - 4	Clay, dark gray, silty
4 - 14	Silt, dark gray, clayey, moist
14 - 19	same, wet
19 - 29	Clay, silty
29 - 34	Sand, very fine to medium, silty, wet
34 - 39	same, fine to coarse, no silt
39	Total depth    Developed: Air Jetting

10-slot screen set 29 to 39, gravel-packed, bentonite seal 19 to 21 feet

Well #23. Located 150 feet north and 30 feet west of guard house, 40 feet north of road to elevated pumps.

RL-1  
Elev: 424.28  
S-U: 2'-6"

Depth interval    Material encountered

0 - 2 feet	Gravel and fill
2 - 9	Silt, green-gray, clayey
9 - 19	Clay, silty, moist
19 - 24	Silt, gray, sandy, wet
24 - 29	Sand, very fine to fine, silty, wet
29 - 44	Silt, gray, clayey, moist
44 - 49	Sand, silty, wet
49	Total depth    Developed: Air Jetting

10-slot screen set 39 to 49, gravel-packed, bentonite seal 15 to 18 feet

Well #24. Located in light oils dock area, 8 feet from parking area, 75 feet southeast of building.

RL-2  
Elev: 426.82'  
S-U: 3'-2"

Depth interval    Material encountered

0 - 2 feet	Fill, silty
2 - 24	Silt, dark gray, clayey
24 - 29	Silt, sandy, strong hydrocarbon odor, wet
29 - 34	same, more sand
34	Total depth      Developed: Air Jetting

10-slot screen set 24 to 34, gravel-packed, bentonite seal 20 to 23 feet

Well #25. Located 4 feet east of #24.

RL-2S  
Elev: 426.68'  
S-U: 2'-10"

Depth interval    Material encountered

0 - 4 feet	Fill, silt, rocks
4 - 7	Silt, dark gray-brown, clayey
7 - 9	same, moist
9 - 14	same, dark green-gray
14	Total depth      Developed: Air Jetting

20-slot screen set 4 to 14, gravel-packed, bentonite seal to surface

Well #26. Located 5 feet north of #23.

RL-1S  
Elev: 424.42  
S-U: 2'-9"

Depth interval    Material encountered

0 - 2 feet	Gravel
2 - 7	Silt, brown to gray-green
7 - 14	same, black, clayey, moist
14	Total depth      Developed: Air Jetting

20-slot screen set 4 to 14, gravel-packed, bentonite seal to surface

Well #27. Located 200 feet south of red building, 4 feet east of road on west side of waste disposal area.

RL-14 S  
Elev: 431.44'  
S-U: 2'-3"

Depth interval    Material encountered

0 - 3 feet	Rock and road fill
3 - 6	Silt, light brown
6 - 8	Sand, very fine, silty, black
8 - 13	same, wet
13 - 14	Silt, black, clayey
14	Total depth    Developed: Air Jetting

20-slot screen set 4 to 14, gravel-packed,  
bentonite seal to surface

Well #28. Located 15 feet southwest of road on southwest corner of pond 8.

RL-13 S  
Elev: 429.49'  
S-U: 2'-8"

Depth interval    Material encountered

0 - 8 feet	Fill, gravel and silt
8 - 9	Silt, dark gray, clayey, moist
9 - 12	same, sandy
12 - 14	same, dark brown, clayey
14	Total depth    Developed: Air Jetting

20-slot screen set 4 to 14, gravel-packed,  
bentonite seal to surface

Well #29. Located 500 feet south of gate to drive between ponds 4 and 5, 3 feet east of road.

RL-11 S  
Elev: 426.85'  
S-U: 2'-11"

Depth interval    Material encountered

0 - 6 feet	Silt, light brown
6 - 14	same, gray-brown to green-gray, clayey
14 - 19	Clay, yellow-brown, silty, moist
19	Total depth    Developed: Air Jetting

20-slot screen set 9 to 19, gravel-packed,  
bentonite seal 12 to 14 feet

Well #30. Located 6 feet north of #17.

RL-7S  
Elev: 430.63'  
S-U: 2'-5"

Depth interval    Material encountered

0 - 3 feet	Fill
3 - 4	Silt, tan-brown
4 - 16	Clay, gray-green to dark brown, moist
16 - 19	Silt, yellow-brown, clayey
19	Total depth    Developed: Air Jetting

20-slot screen set 9 to 19, gravel-packed,  
bentonite seal 6 to 8 feet